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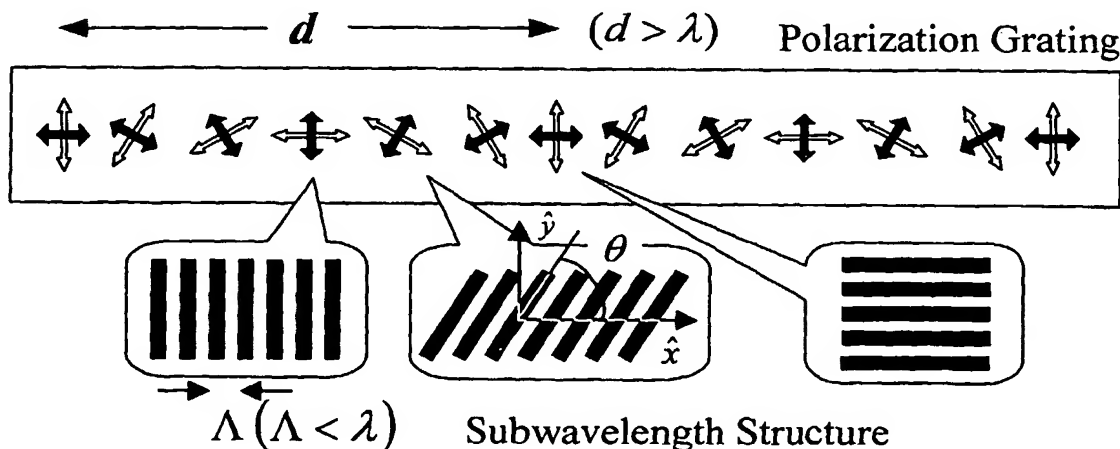
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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: **GEOMETRICAL PHASE OPTICAL ELEMENTS WITH SPACE-VARIANT SUBWAVELENGTH GRATINGS**



(57) Abstract: A space variant polarization optical element for spatially manipulating polarization-dependent geometrical phases of an incident light beam. The element comprises a substrate with a plurality of zones of gratings with a continuously varying orientation. The orientation denoted by $\theta(x-y)$ is equal to half of a desired geometrical phase (DGP) modulus 2π . Each grating has a local period that is smaller than the wavelength of the incident light beam. In other embodiments of the present invention the substrate comprises a plurality of zones of gratings with a continuously varying orientation.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL03/00541

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A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G02B 5/18, 5/30
US CL : 359/486, 489, 566, 575

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 359/486, 489, 566, 575

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,847,872 A (ITO) 08 December 1998 (08.12.1998), see entire document.	1,14,20,31,36-38,47, 53,60,65,66
A	TERVO et al, Paraxial-domain diffractive elements with 100% efficiency based on polarization gratings, Optics Letters Vol. 25, No. 11, 01 June 2000 (01.06.2000), pages 785-786.	1-66
A	GORI, Measuring Stokes parameters by means of a polarization grating, Optics Letters, Vol. 24, No. 9, 01 May 1999 (01.05.1999), pages 584-586.	1, 9
A	BOMZON et al, Computer-generated space-variant polarization elements with subwavelength metal stripes, Optics Letters, Vol. 26, No. 1, 01 January 2001 (01.01.2001), pages 33-35.	1-66
A	BOMZON et al, Pancharatnam-Berry phase in space-variant polarization-state manipulations with subwavelength gratings, Optics Letters, Vol. 26, No. 18, 15 September 2001 (15.09.2001), pages 4124-1426.	1-66

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

22 November 2003 (22.11.2003)

Date of mailing of the international search report

16 JAN 2004

Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL03/00541

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claim Nos.: 67 and 68
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
Claims 67 and 68 are omnibus in character and their scope cannot be determined. See also PCT Rule 6.2.
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

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INTERNATIONAL SEARCH REPORT

PCT/IL03/06541

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Continuation of B. FIELDS SEARCHED Item 3:

INSPEC; USPAT EAST

search terms: (subwavelength grating) (geometrical phase) pancharatnam berry; (subwavelength adj grating) (polarization adj grating)
((geometric topological pancharatnam berry) adj phase) (form adj birefringence)